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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

09/893,488

06/29/2001

Tomoaki Kato

Q63852

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08/09/2004

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EXAMINER

LEURIG, SHARLENE L

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 08/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 09/893,488 | KATO ET AL. | |
| | Examiner | Art Unit | |
| | Sharlene Leurig | 2879 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 21 and 23-28 is/are pending in the application.
- 4a) Of the above claim(s) 23-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 21, 27 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-15, 21 and 23-28 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment filed on November 10, 2003 has been entered and acknowledged by the examiner.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-15, 21, 27 and 28, drawn to a spark plug, classified in class 313, subclass 143.
- II. Claims 23-26, drawn to a method of producing a spark plug, classified in class 445, subclass 7.

The inventions are distinct, each from the other because of the following reasons:

3. Inventions I and II are related as process of making and product made.

The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the spark plug can be made by a heat treatment carried out in a nitrogen or an inert gas atmosphere.

4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

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5. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

6. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

7. Newly submitted claims 23-26 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the claims are directed to a process of making a spark plug, as discussed above.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 23-26 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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9. Claims 1-4, 7 and 27 stand rejected under 35 U.S.C. 102(b) as being anticipated by Mamoru et al. (JP 06-338376) (of record).

Regarding claim 1, Mamoru discloses a spark plug with a center electrode (Figure 1, element 3) and a ground electrode (Figure 1, element 4) "which forms the spark discharge gap G" between it and the center electrode (paragraph 0009, line 6). The igniter (Figure 1, elements 18 and 19), fixed to the ground electrode in the example illustrated by Figure 1, faces the spark discharge gap, G. Mamoru discloses that the "precious alloy electrode" may be formed in the igniter on the ground electrode or the center electrode (paragraph 0032, line 5). The gas concentration of nitrogen and oxygen of the Pt-nickel alloy composing the igniter is 100 ppm or less (paragraph 0029, line 5). The igniter (18, 19) is fixed to the ground electrode, as shown in Figure 2, via a weldment (paragraph 0019).

Regarding claims 2 and 3, the principal component of the igniter consists of at least one of the following metallic materials: platinum or a platinum alloy such as a "Pt-nickel alloy" or an "Ir-nickel alloy" or a "Pt-Ir-nickel alloy" (paragraph 0014, line 3).

Regarding claim 4, the Pt-nickel alloy consists of 20% of the weight in nickel, fitting into the claimed range of 2% to 40% of total mass (paragraph 0017, line 2).

Regarding claim 7, Mamoru further discloses the spark plug to be designed in such a way to "prevent the injury on an internal combustion engine," which is intrinsically a gas engine, in which it is mounted (paragraph 0005, line 4).

Regarding claim 27, Mamoru discloses a portion of the igniter (18, 19) being joined to either the ground electrode or the center electrode (paragraph 0032), and specifically describes the joining of the portion of the igniter to the electrode as being joined via a weldment (paragraph 0019). At least a portion of the igniter (18) is not fused to the center electrode, that portion being the portion facing the discharge gap.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 5-6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Abe et al. (6,215,234) (of record).

Mamoru discloses a spark plug with all the limitations discussed above but lacks a spark discharge gap defined by the range of 0.2 mm to 0.6 mm.

It is well known in the art to lower the required voltage of a spark plug.

Abe teaches a spark discharge gap within a range of 0.2 mm to 0.4 mm (column 2, line 5), which fits within the claimed range of 0.2 mm to 0.6 mm and is therefore not more than 0.6 mm. Abe teaches this spark gap range in order to lower the required voltage for producing sparks (column 2, lines 15-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a spark discharge gap fitting with a range of 0.2 mm to 0.4 mm in order to lower the required voltage to produce sparks, as taught by Abe.

12. Claims 8-12, 15, 21 and 28 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Chang et al. (6,045,424) (of record).

Regarding claim 8, Mamoru discloses a spark plug with a center electrode (Figure 1, element 3) and a ground electrode (Figure 1, element 4) "which forms the spark discharge gap G" between it and the center electrode (paragraph 0009, line 6). The igniter (Figure 1, elements 18 and 19), fixed to the ground electrode in the example illustrated by Figure 1, faces the spark discharge gap, G. Mamoru discloses that the "precious alloy electrode" may be formed in the igniter on the ground electrode or the center electrode (paragraph 0032, line 5). The gas concentration of nitrogen and oxygen of the Pt-nickel alloy composing the igniter is 100 ppm or less (paragraph 0029, line 5). The igniter (18, 19) is fixed to the ground electrode, as shown in Figure 2, via a weldment (paragraph 0019).

Mamoru lacks a crystal grain mean diameter of more than 50 micrometers.

However, Mamoru recognizes the need for a long spark plug life (paragraph 0024, line 5) and the suppression of crack formation in the noble metal material (paragraph 0026, line 5).

Regarding claim 8 and 21, Chang teaches a spark plug with an igniter tip made of a noble metal with a mean crystal grain diameter of 250 microns (column 5, lines 36-37). The formation of a tip with grains of this mean diameter helps prevent corrosion and cracking (column 5, lines 29-31).

Regarding claim 9, the mean diameter of the crystal grain is defined as a mean value of a maximum interval between a pair of parallel lines which are tangent to an outline of the crystal grain. Though Chang does not explicitly disclose how the mean diameter is measured, the Examiner takes Official Notice that the diameter of an irregular object is found by measuring the line drawn between two parallel lines at the extremes of the object. The "mean diameter" is inherently the average of all the data points collected.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a tip having an average crystal grain diameter of more than 50 microns in order to provide a spark plug with a more robust tip, as taught by Chang.

Regarding claim 10, Mamoru discloses an igniter made of a material that is a platinum-iridium alloy with a sub-component of nickel (paragraph 0014).

Regarding claim 11, Mamoru discloses a metallic material composing the igniter is made from a platinum-iridium alloy (paragraph 0014). Chang also teaches a metallic material composing the igniter is made from a platinum-iridium alloy (column 5, line 37).

Regarding claim 12, Mamoru discloses a Pt-nickel alloy consisting of 20% of the weight in nickel (paragraph 0017), which falls into the claimed range of 2 to

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40%. Chang also teaches a platinum-iridium alloy where iridium is 20% of the alloy, which falls into the claimed range of 2 to 98% (column 5, line 37).

Regarding claim 15, Mamoru discloses the spark plug to be designed in such a way to "prevent the injury on an internal combustion engine," which is intrinsically a gas engine, in which it is mounted (paragraph 0005, line 4).

Regarding claim 28, Mamoru discloses a portion of the igniter being fixed to the ground electrode via a weldment (paragraph 0019) and at least a portion of the igniter not being fused to the ground electrode, that portion being that which faces the discharge gap.

13. Claims 13 and 14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Chang et al. (6,045,424) (of record) as applied to claims 8-12, 15, 21 and 28 above, and further in view of Abe et al. (6,215,234) (of record).

Mamoru discloses a spark plug with all the limitations discussed above but lacks a crystal grain mean diameter of more than 50 micrometers. Chang teaches a crystal grain diameter of more than 50 microns. Both Mamoru and Chang lack a spark discharge gap defined by the range of 0.2 mm to 0.6 mm.

It is well known in the art to lower the required voltage of a spark plug.

Abe teaches a spark discharge gap within a range of 0.2 mm to 0.4 mm (column 2, line 5), which fits within the claimed range of 0.2 mm to 0.6 mm and is therefore not more than 0.6 mm. Abe teaches this spark gap range in order to lower the required voltage for producing sparks (column 2, lines 15-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a crystal grain diameter of more than 50 microns in order to produce a more hardy igniter, and to further modify it with a spark discharge gap fitting with a range of 0.2 mm to 0.4 mm in order to lower the required voltage to produce sparks, as taught by Abe.

Response to Arguments

14. Applicant's arguments filed on November 10, 2003 have been fully considered but they are not persuasive.

The applicant has argued that the claimed invention is patentable over the Mamoru reference, as Mamoru discloses a complete fusion of the noble metal material 18 into the fused solid noble metal alloy layer 19, while the claimed invention now recites a portion of the igniter being fixed to at least one of the center electrode and the ground electrode via a weldment, which does not constitute part of the igniter, which is not fused or coagulated through welding (page 11).

The language of the claimed invention fails to differentiate the invention from the spark plug of the Mamoru reference, which has an igniter (18, 19) welded to the ground electrode or the center electrode (paragraphs 0019 and 0032).

The applicant has further argued that the Mamoru reference has no portion corresponding to the igniter of the claimed invention, as the layer 19

corresponds to weldment, but not to the igniter. The igniter of Mamoru is formed of elements 18 and 19, which are welded to the ground electrode 14. Therefore Mamoru discloses both the claimed igniter and the claimed weldment.

The applicant has further argued that the limitation of the nitrogen and oxygen content in Mamoru is in the noble metal layer 19 that is completely fused, while the claimed invention's limitation of the oxygen content is directed to the non-fused igniter. Such a limitation is not recited in the present claims and therefore cannot be relied upon to overcome the rejection under the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (571) 272-2455. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sll



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